AOIT Computer Networking

Lesson 12

Host Access

Student Resources

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| Resource | Description |
| Student Resource 12.1 | Anticipation Guide: Internet Services |
| Student Resource 12.2 | Reading: Internet Services |
| Student Resource 12.3 | Worksheet: Residential Network Investigation |
| Student Resource 12.4 | Assignment: Internet Services Poster |
| Student Resource 12.5 | Reading: Internet Service Providers |

Student Resource 12.1

Anticipation Guide: Internet Services

Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Directions: For each of the statements below, underline “I agree” if you think the statement is accurate or “I disagree” if you disagree with it. Write one reason to explain your guess.

|  |  |
| --- | --- |
| **Although DSL Internet travels through your home telephone line, you can still make phone calls while using the Internet.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **T1 lines are faster than DSL or cable Internet.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **When you use a dial-up modem to connect to the Internet, anyone who tries to call you by phone will get a busy signal.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **Cable Internet is used by people from rural areas who can’t connect to the Internet using other services.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |

|  |  |
| --- | --- |
| **Cable Internet is offered through a telephone service provider.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **With DSL, it’s just as fast to upload files as it is to download them.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **Business users often use satellite Internet, because they can afford to have their own satellite dish.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **Having a leased line means that you rent the full phone line for your Internet service, so the telephone company guarantees a certain Internet speed.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **Dial-up service never became popular because it’s too slow.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **To use DSL service, you need to put special filters on phones.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |

Student Resource 12.2

Reading: Internet Services

Directions: Read about each of the following types of Internet services to learn about different ways to connect to the Internet from a residential network or a business network.

Dial-Up Modem

Fifteen years ago, most everyone used a dial-up modem for connecting to the Internet. A modem connects a computer to the Internet via a land telephone line. Compared to newer technologies, dial-up is a very slow way to connect to the Internet. It may be too slow and unreliable to load video, online games, or Flash and multimedia websites.

Another limitation of dial-up is that accessing the Internet over dial-up ties up your phone line. If someone tries to call you, you will have to place your Internet connection on hold if you want to answer the phone.

The benefit of dial-up today is its cost. For about $10 to $15 a month for a service subscription, and a modem that might cost under $20, you can connect to the Internet. However, if you can afford it, you might prefer to use DSL or cable because they are much faster and more reliable, and they don’t monopolize your telephone line.

Digital Subscriber Line (DSL)

Like a dial-up connection, DSL also works over your plain old telephone service (POTS). However, DSL has the benefit of being 25 times faster than dial-up, and it doesn’t tie up the phone line. You can make phone calls while using the Internet and use all kinds of multimedia services like video, live online games, and image-heavy websites. Data (Internet) and voice (telephone) are run at different frequencies on the same cable via a technology called *multiplexing*. Multiplexing is commonly known as *broadband Internet*.

Users connecting with DSL will need an Ethernet network adapter in the computer and a DSL modem that is a separate box from the computer. Additionally, since the connection runs over the phone lines, users will need special phone filters that allow the data to transfer.

The speed of DSL is limited to 1.5 Mbps (megabits per second), much faster than the 56 Kbps (kilobits per second) speed of dial-up. Since most home users download many more files and websites than they upload, DSL allots more bandwidth speed to downloads. DSL thus provides what is called an *asymmetric connection*, which means that uploading files will take longer than downloading them.

Another limitation of DSL service is that it can only travel across cables up to 16,000–18,000 feet long, or about 3.4 miles. This means that if the cable between you and your service provider is near its limit of 16,000 or 18,000 feet, your service might be slower. Keep in mind that cable is usually strung along winding routes, so the limit isn’t a bird’s-eye distance from your service provider. If you are too far from an ISP to run DSL, then cable Internet is your best bet for getting a fast and reliable connection.

Cable Internet

Cable Internet is comparable in speed and cost to DSL but has some key technical differences. Cable Internet isn’t offered through your phone lines, but uses channels on your TV’s cable connection. It is offered by the same service provider you can order cable TV from.

With a cable Internet connection, your speed isn’t guaranteed by your service provider, but it also isn’t limited by a certain length of cable the way DSL is. Instead, you share the cable Internet service with your neighbors, and your bandwidth speeds will depend on how much everyone on the network is downloading. At peak times, when all your classmates are home from school, the Internet connection might be slower than it is in the middle of the night when no one is using the Internet.

Like DSL, cable also provides an asymmetric connection. This means you can download faster than you can upload files, because more channel space is allotted for downstream data transfer.

If you decide to use cable Internet, you will need to get a cable modem and have an Ethernet network adapter in your computer. You can also connect to a cable modem using a USB cable, but your speed will be slower as a result.

Leased Line (T1, T3, or OC3)

Instead of subscribing to one of the services described above, most businesses lease a line for their Internet service. By leasing their own line from a phone company, they have a guaranteed bandwidth and speed, which is just as fast for uploading as it is for downloading. This is especially useful for companies that provide web services or host a website, since users will be downloading information from the company servers (and the servers will be uploading the information).

T1 lines, which have a speed of 1.544 Mbps, used to offer the fastest connection, but modern-day DSL and cable Internet networks are actually faster. However, higher speed circuits like T3 (45 Mbps) and OC3 (155 Mbps) are comparable to or faster than DSL and cable.

Satellite Internet

In many parts of the United States and in the world, there are few or no DSL or cable television lines available. Many people live without modern technology, either because they can’t afford it or because they are just too far from any of the service providers. For these communities, satellite Internet is a viable alternative.

With satellite Internet service, the user connects through a satellite dish that receives and broadcasts signals. The service is slower than DSL or cable but faster than a dial-up connection.

Student Resource 12.3

Worksheet: Residential Network Investigation

Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Directions: Investigate someone’s home Internet connection. If you don’t have a connection in your home, ask a friend, classmate, relative, or teacher to let you take a look at his or her network. Find out who administers the network (who purchased and pays for service) and whether that person is satisfied with the service. Ask if you can perform some diagnostic tests to analyze the network, and use an online bandwidth speed tool to test the network speed. Answer the following questions about the network you’ve investigated.

1. What type of Internet connection is being used (DSL, cable, dial-up, etc.)?
2. Is the service reliable, and are users satisfied with it?
3. Why did the users choose this service over their other options (was it the cost, features, reliability, speed, a recommendation they received, something else)?
4. Draw or describe the topology of the network: what kind of cable is used, what external modems or routers are used, and so forth.
5. Use one of the following online tools to test the network speed. Record the results below.

<http://www.speedtest.net/>

<http://reviews.cnet.com/7004-7254_7-0.html>

<http://www.bandwidthplace.com/>

<http://www.dslreports.com/stest>

Student Resource 12.4

Assignment: Internet Services Poster

Directions: Working with your group, create a table, chart, or diagram to compare and contrast the different Internet services you have just learned about. You can draw topology diagrams, use a Venn diagram, or use some other graphical organizer to show your comparison.

Decide as a group how you will design the poster, and assign each group member a task, whether it’s drawing or writing up the information for a part of the poster.

Your poster should compare and contrast the following aspects of Internet services:

* The type of physical components a user needs to connect to each network
* The relative speed of each service
* Any benefits or disadvantages
* The type of service providers and infrastructure (telephone lines, cable lines, or other) associated with each

Be sure to include these design elements when developing your poster:

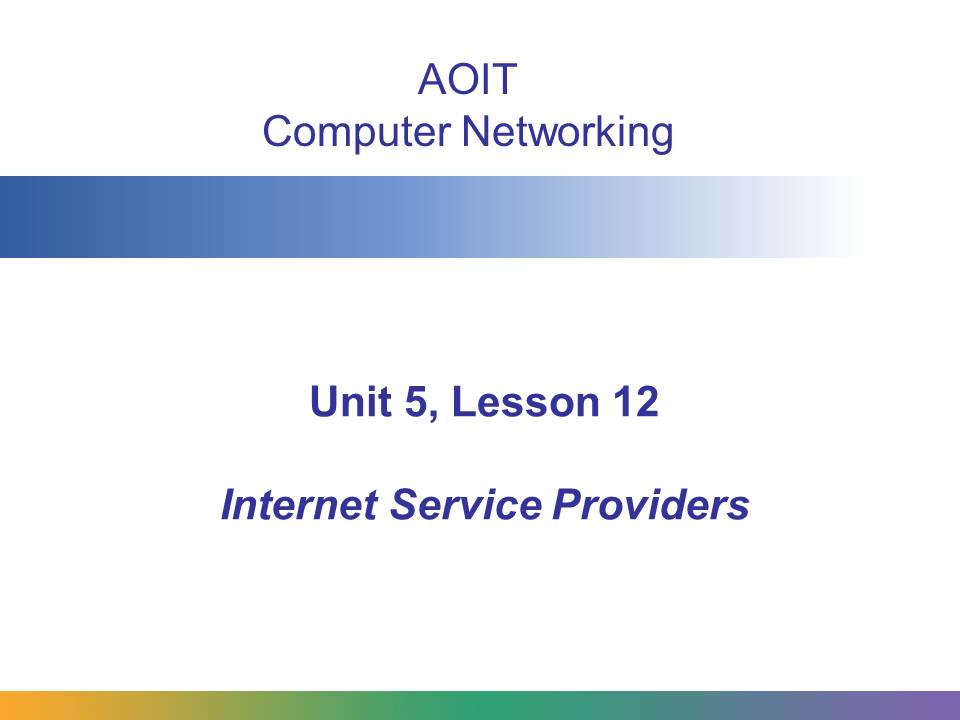
* Use a chart or diagram to compare or contrast the Internet services.
* Use informative text with bullet points or short phrases to convey your meaning.

Make sure your poster meets or exceeds the following assessment criteria:

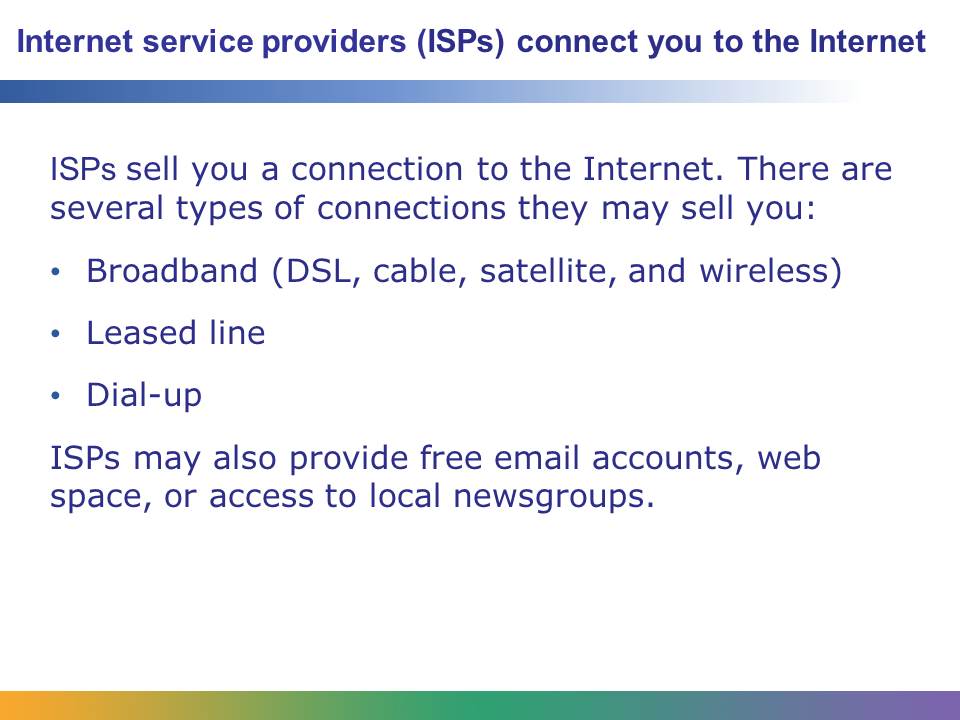
* Using a visual diagram, a chart, or some form of a graphical organizer, the poster provides an accurate and complete comparison of the different Internet services.
* The poster explains the benefits or disadvantages of each service.
* The poster compares the type of service providers and the type of infrastructure used by each.
* The poster uses informative text with bullet points or short phrases.
* The poster is neat and uses proper spelling and grammar.

Student Resource 12.5

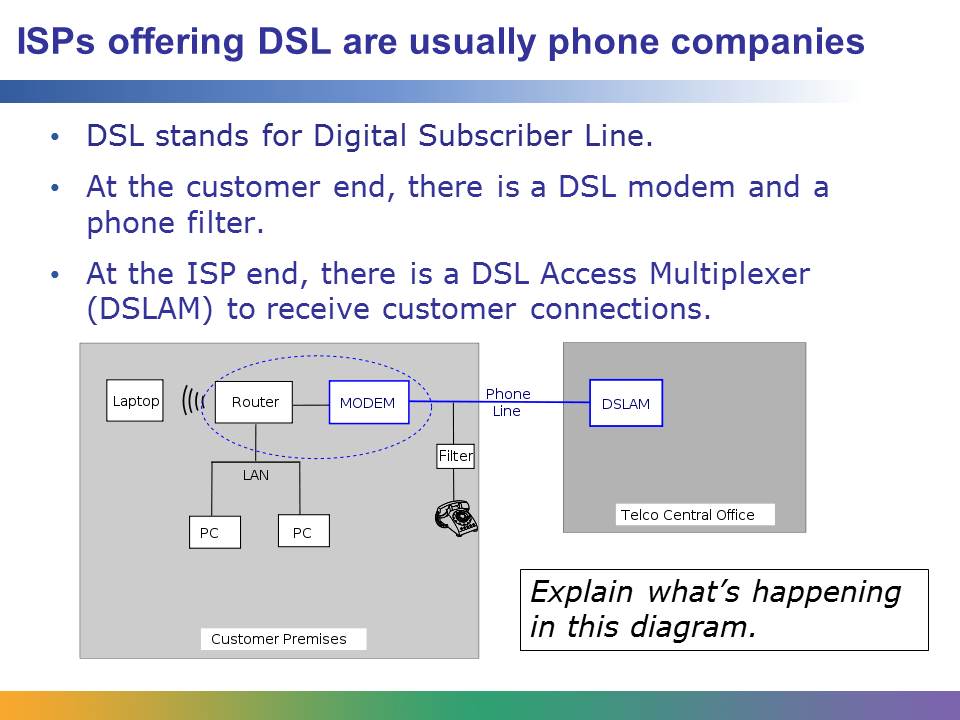
Reading: Internet Service Providers



This presentation explains what an Internet service provider, or ISP, is. It describes the different types of ISPs that are available, and explains how an ISP connects you to the Internet.



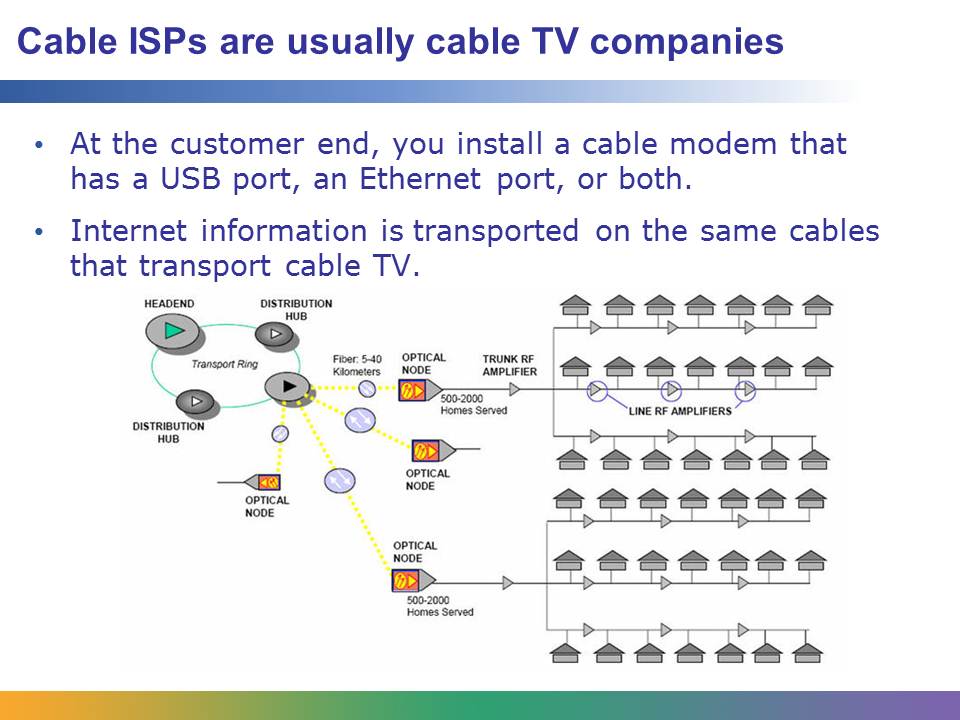
When you decide on an ISP, it’s important to know which one offers the most effective service at the best price for your location. Depending on your location, you may have a choice of DSL or cable. If your location does not have access to DSL or cable lines, you may need to consider a satellite or dial-up ISP. If you have a business, or if you need extremely reliable service and are willing to pay for it, you may consider a leased-line ISP.



DSL requires equipment at the customer end and at the Internet service provider end. At the customer's location, there is a DSL modem. A DSL filter is installed on each outlet for telephone handsets, to remove the high frequency band. This eliminates interference with the operation of the telephone set and enables simultaneous use.

At the service provider location, there is a DSL Access Multiplexer (DSLAM) to receive customer connections. A DSLAM takes connections from many customers and aggregates them onto a single high-capacity connection to the Internet.

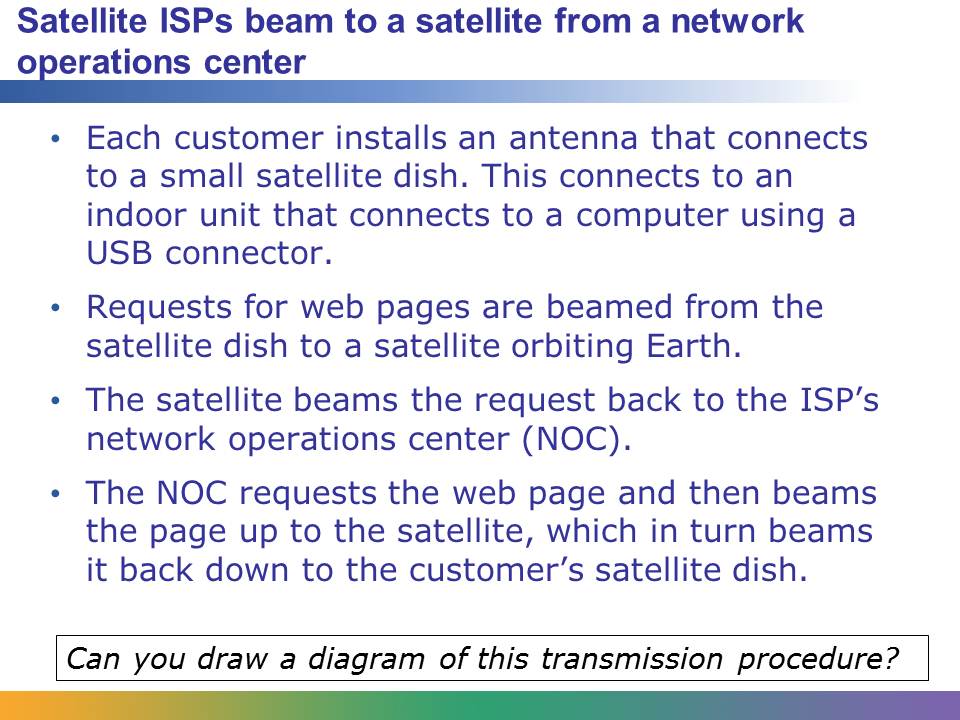
For the most part, your choice of ISPs for DSL service is limited to the same companies that provide phone service in your area, or a secondary provider who is actually reselling you the same DSL service supplied by your phone company.



When you sign up for a cable broadband Internet connection, generally the ISP provides you a cable modem that has a USB port, an Ethernet port, or both USB and Ethernet port. This modem communicates with the cable modem termination system (CMTS) located at the ISP station (sometimes called a “headend”).

One big difference between cable and DSL is that on a cable network, all houses in your neighborhood use the same cable, whereas with DSL, Internet access is provided through your individual phone line. So the data transmission speed for cable may vary according to how many subscribers are using the service at the same time.

Data coming from the Internet to your cable modem uses a 6 MHz channel, just like a single channel of cable TV. Data going from your cable modem to the Internet requires just 2 MHz of bandwidth.

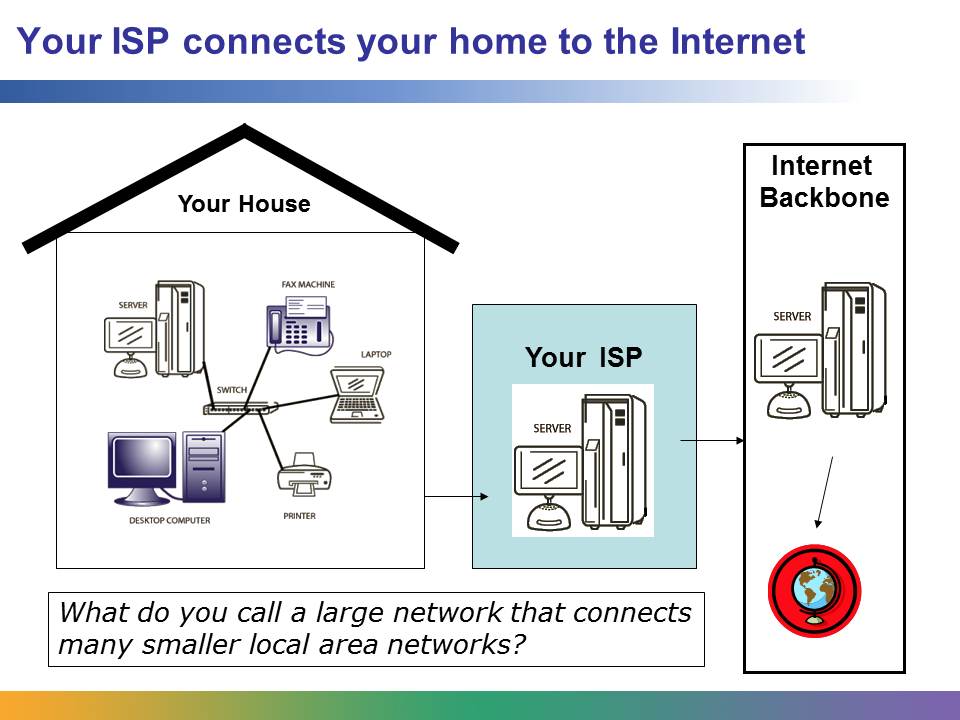


When the customer sends a request for a web page, the satellite software attaches a piece of code (called a tunneling code) to the request. The request is then beamed from the satellite dish installed on your house to a satellite orbiting Earth. The satellite relays the request back down to Earth to the ISP’s network operations center, or NOC, which is where the customer’s actual Internet connection is located. The NOC requests that web page for you and then beams it up to the satellite in space. The satellite beams the page back down to the dish on the customer’s house, and the dish sends the web page through the satellite modem and onto the PC monitor. The whole process typically takes less than half a second!

Typically a completely clear line of sight between the satellite dish and the satellite is required for the system to work. The signal can be absorbed and scattered by rain, and the signal is also impacted by the presence of trees and other vegetation in its path.

The satellites used for two-way Internet service orbit 23,000 miles or more above the equator. This means that a round-trip transmission travels a total of about 92,000 miles. Even though the signals travel at nearly the speed of light, this accounts for more delay than found in Earth-based networks. This delay is known as latency.

As with cable modem ISPs, your data transmission speed may vary according to how many subscribers are using the service at the same time as you.



The type of ISP you choose determines how you connect with your ISP—whether it’s a telephone line, a cable, or a wireless satellite.

Once you are connected to your ISP, the information you send over the Internet gets routed through your ISP’s servers and out to other servers on the Internet on fiber-optic cables. These main Internet servers handle a lot of traffic and are connected also via thick fiber-optic cables. The main Internet servers are known as the Internet backbone. There are backbones across the world that carry data globally, routing data packets along the quickest, smoothest path to their destinations.

Since the Internet covers a large area, it is known as a wide area network, or WAN. In fact, the Internet is the largest of all WANs.